over Major Dwight, a wealthy merchant and son of a former mayor.

The Central Labor Union of Cleveland has a new law allowing only delegates employed at their trades seats in the central body.

All members of organized labor in St. Paul, Minn., on March 29 contributed their wages toward a fund for building a coliseum.

The building trades councils of Cincinnati, Covington and Newport have combined to demand an eight-hour day on May 1.

Bakers of Boston have secured a ten-hour work day and disputes during the year ending May 1, 1903, will be settled by arbitration.

The Des Moines City Railway Company has voluntarily proposed to sell eight tickets for a quarter, to be accepted as fares between 6 and 7 o'clock in the morning and 6 and 7 o'clock in the evening.

Frank Lopez and E. Wollock, Chicago nonunion cigar manufacturers, have been arrested, charged with removing union labels from empty boxes, changing the numbers and placing them on boxes of cigars of their own make.

The Metropolitan Street-railway Company of New York city has established an old-age pension fund. The retiring age is placed at seventy years. For twenty-five years' service a pension of 25 per cent. of wages is paid, and for thirty-five years the pension is 40 per cent. of wages.

An attempt will be made at the next session of the Indiana Legislature by the organized labor of the State to pass a bill abolishing the contract system of employing convicts and establish, instead, schools in the penitentiaries to teach bricklaying, stone cutting, cabinet making, carpentering, plastering, painting and printing.

Organized labor in Kentucky has been making great strides in the way of securing labor legislation. At the session of the Legislature recently closed were passed a child labor bill fixing the age limit at fourteen years, a factory-inspection bill providing for two factory inspectors, the legalization of Labor day as a legal holiday, repeal of the turnpike law, a barbers' sanitary law making it compulsory for barbers to pass an examination, and a two-week pay bill for the miners.

The Gas Belt Labor News has this solution to offer of the conditions of labor in England: "Contractor Stewart, of Chicago, has practically completed the greatest feat in rapid building construction on record. He has started the tongues of all Britain to wagging by constructing one of the largest manufacturing plants in the world in ten months that no English builder would undertake short of five years. Mr. Stewart took English bricklayers and trained them to bring their day's work up from 500 to 2,000 brick per day. This simply astounded the English bricklayer. This feat will probably start a revolution in English slow methods and is, perhaps, a greater lesson in causes of British trade decay than all the learned essays of English statesmen."

GROWTH OF A CRYSTAL

MYSTERY OF THE LABORATORY SOLVED BY PHOTOGRAPHY.

Unique Experiments Made by a Harvard Professor, Who Combined Microscope with Camera.

CAMBRIDGE, Mass., April 19.—One of the latest applications of photography to the solution of the problems of science has been made by Prof. Theodore William Richards, of the department of chemistry at Harvard, in the study of the formation and growth of crystals. The experiments have led to definite discoveries toward which observers have been working for nearly two-thirds of a century. Previous investigations had been made with the assistance of the microscope alone and the record of what they developed was the work of human eyesight, human memory and transcription by human hands—all of which are obviously liable to unconscious error or misstatement. By adding the camera to the microscope Professor Richards, assisted by Mr. E. H. Archibald, a graduate student, has succeeded not only in securing a more accurate, permanent and convincing record of the growth of several varieties of crystals, but in obtaining many details of this development, which had previously escaped merely visual observation.

The study of the birth of crystals has interested chemists since 1839. Whether matter in solution took the form of liquid globules just before crystallization began, or whether the little particles gathered in clusters immediately the temperature and degree of saturation to which they were subjected reached the proper point, has been an unanswered question, the generally accepted opinion, however, inclining to the former theory. Professor Richard's investigations, although he says that they should merely form the basis of further study, go to show that the formation of crystals from a solution is accomplished with no intervening process—that is, that the second theory is correct. So rapid is the growth of crystals that, though the intervals between Professor Richards's exposures were only a fifth of a second, many changes occur even in so short a time as this, and it may be argued, therefore, that at some time between the blank plate with which each series of phtographs begins and the next plate with its impression of the tiny particle which is to grow into the developed crystal, the liquid globule may have formed and passed into another state. On the other hand, no evidence of this was found on any of the hundreds of plates taken; and it seems hardly likely that this could have been the case if the "globule theory" were correct.

CRYSTAL FORMATION.

A crystal of potassium iodide—to name one of the substances on which Professor Richards has been at work—takes only a few seconds to grow from the first tiny point to appreciable size. The point begins by spreading into a thin plate, which thickens by degrees as it increases in size, and so rapid is its development that even with the short exposure that Professor Richards allowed the images were frequently blurred. A comparison of successive photographs shows that the growth of a crystal during the first second of its life is very much greater than later on. Frequently the little structure increases less than half as rapidly in the second second as in the first, and much more slowly afterwards. There does not seem to be any exact law in the matter, but there is a certain regularity apparent in all the photographs, though this regularity is so easily affected by varying conditions of temperature and evaporation as to be very difficult of exact calculation. It is particularly interesting that a crystal seems generally in its earlier stages to grow in the same proportion in all directions. After a while it becomes broader in proportion to its length, but by this time neighboring crystals have grown so much as to approach it and so alter the conditions. It is this quick growth at first which doubtless explains the suddenness of its appearance to the eye of the observer; at the same time the fact places a serious bar in the way of more precise study of the beginning of the phenomenon.

Professor Richards's task was as difficult as it was interesting. His microscope had to be of great power and the action of the camera shutter as rapid as it could be made. Then, in order that the period of exposure might be the briefest possible and at the same time a clear negative obtained, a very intense degree of illumination was necessary, since the greater the efficiency of the combination of microscope and camera the more brilliant the light must be—a difficulty which was complicated by the further fact that most crystals are so transparent as to absorb but little light at the best, so that it is hard to obtain a distinct image of them even in the strongest light. Moreover there must be no vibration of the camera or of the object of study, which required that the machinery for changing the plates should be practically frictionless and adjusted with the greatest nicety.

Two different methods were used to overcome the difficulty of securing a sufficiently high degree of illumination. By the first a series of bright images was produced in a dark field; by the second dark images were registered in a succession of bright fields. In the first method it was simpler to move the crystallizing solution than the photographic film, for, the field being dark, only that part of the plate on which the crystal was pictured was affected by exposure and a very slight movement of the object changed its location sufficiently to avoid superimposing one image over another. To accomplish this the slide bearing the drop of liquid was connected with a very ingenious device which drew it to one side every time the revolving shutter closed, leaving it exposed to a new place on the sensitized plate when the shutter opened again.

EXPERIMENTS WITH LIGHT.

Many attempts were made with different kinds of light before Professor Richards obtained the results he sought. No combination of incandescent electric lights could be made strong enough, so that in the end sunlight, directed by mirrors and condensed by reflectors and lenses, was found most satisfactory. Some very interesting experiments were made with polarized light in taking bright images on a dark field. Sunlight was intercepted by crossed prisms of Iceland spar so that only so much of it as had been deflected by the crystalline structure was allowed to emerge. The objection to this method was that if the "prenatal" condition of the crystals were globular the globule would probably have had no effect on polarized light, being too uniform in structure to afford any obstacle to its uninterrupted passage; and thus no conclusion regarding the globule theory could have been reached. In the later stages of crystallization, however, the use of polarized light was most effective.

Professor Richards questions whether it is possible to obtain more positive knowledge than is afforded by his experiments until some radical improvement in the necessary apparatus has been devised. He is inclined to think, however, that the blurred appearance caused by the rapid expansion of the crystals in their earlier stages of development may have been mistaken by former investigators for the momentary appearance of a globule of liquid. Even in his own "microphotographs" a slight resemblance may be noted, and in one or two cases deliberate study, such as was, of course, impossible before the camera was brought into the investigation, is necessary to detect evidence of structure in these first appearances of the budding crystal.

This special application of microscopic photography to scientific research, such as Professor Richards has here made, is, however, as he points out, capable of almost unlimited extension. It is already being used for the study of the changes in the structure of steel at high temperatures, and similar apparatus might easily be employed, he suggests, to obtain a series of kinetoscopic pictures of insects or other microscopic animals or plants. Besides seeing more, the camera sees more exactly, and its record is more permanent and less open to dispute. In astronomy, for example, it has proved to be the most valuable auxiliary which has been introduced for a century, just as it now bids fair to be one of the most important allies of the chemist.

How a Blind Man Tells the Time.

New York Mail and Express.

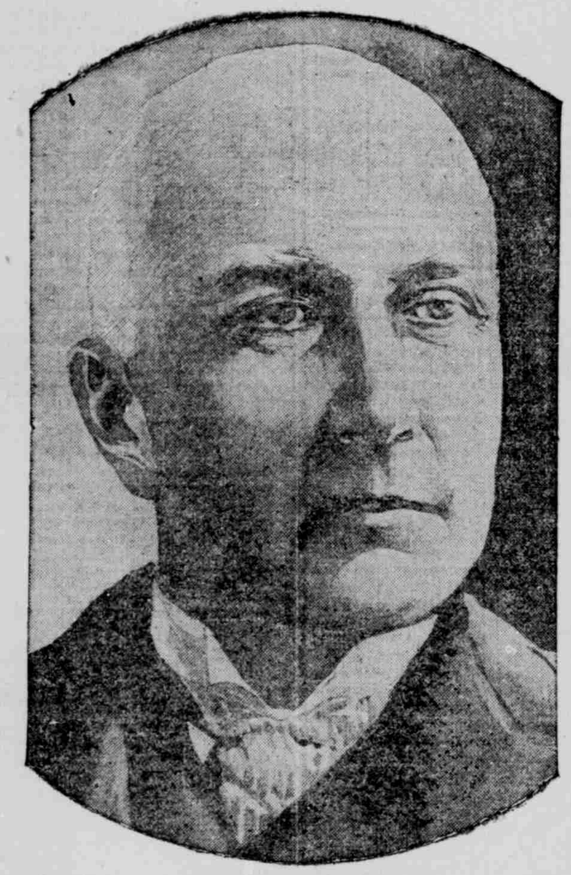
There is a blind organ grinder with a station on one of the downtown streets. The other day a passerby dropped a nickel in his cup, and, noticing that he carried a watch, asked him for the time. It was a queer question to ask, but he wanted to know whether the blind man was simply pretending to be sightless.

"I think I can tell you," said the organ grinder. He held the watch close to his ear and slowly turned the stem winder. "One, two, three, four, five, six, seven, eight," he counted, and then said: "That means eighty minutes. I wound up the watch tightly just as the church clock on the corner struck 3, and so the time ought to be about 4:20 o'clock. Here, look and see how near I came to it."

His questioner looked, and the time was 4:26. He was only six minutes off. "Do you mean to say that you can tell the time of day by winding up your watch?" he asked.

"Not exactly, but I can come mighty near it, usually within ten minutes. It's an easy trick, and all you have to know is how long one click in winding up will run the watch. I'll explain. Suppose that at 3 o'clock I wound my watch until it was tight; that is, until another turn of the stem would apparently break the spring. At 5 o'clock I wind the watch again and find that the winder clicks twelve times before the watch is tight. Then I know that twelve clicks will run the watch 120 minutes and that one click represents about ten minutes of time."

PAST THE HAIR RESTORER STAGE



JOHN D. ROCKEFELLER.

The latest photograph of the Standard oil croesus, Andrew Carnegie's greatest rival as a philanthropist, shows Mr. Rockefeller to be perfectly bald. He was born on July 8, 1839, is worth possibly $200,000,000, and has given large sums to colleges and public charities.

MR. CARNEGIE'S NEW BOOK

OPTIMISTIC VIEW OF LIFE TAKEN BY THE PHILANTHROPIST.

Excerpts from "The Empire of Business"—Young Men of Exceptional Ability Always in Demand.

Andrew Carnegie's new book, "The Empire of Business," which recently was reviewed in the Journal, is attracting much attention. It deals with thrift, the road to fortune, the uses of wealth and other topics. Mr. Carnegie does not attempt to tell how to amass a huge fortune, such as he has, but he gives good advice to young men by telling of his own success, and how they may succeed as he has. Three things in particular he warns the youth against, and first and foremost comes drink.

"You are more likely to fall in your career from acquiring the habit of drinking than from any or all the other temptations likely to assail you," he says. "It may lead to almost any other temptation and reform, but from the insane thirst for liquor escape is almost impossible."

The second danger, he says, is speculation. "Gamesters die poor, and there is certainly not an instance of a speculator who has lived a life creditable to himself or advantageous to the community."

The third danger he warns young men against is the "perilous habit of indorsing, all the more dangerous, inasmuch as it assails one generally in the garb of friendship."

The indorsement of others' notes, however, is taken to be the least of the trinity of dangers. The book is full of anecdote and pleasantry, and, while some of Mr. Carnegie's claims will not bear strong analysis, yet it is written in a strain which is calculated to inspire ambition. Mr. Carnegie is not deliberately misleading nor dangerous. To be able to say things which are not quite true in a way to make them impressive is a valuable talent. Here is an example: "I congratulate poor young men upon being born to that ancient and honorable degree which renders it necessary they should devote themselves to hard work. A basketful of bonds is the heaviest basket a young man ever had to carry. He generally gets to staggering under it."

A FEW EPIGRAMS.

Some of Mr. Carnegie's epigrams are worth repeating. A few follow:

"Nothing in the world is so desirable to every employer as a young man of exceptional ability."

"The great inventions, the improvements, the discoveries in science, the great works in literature have sprung from the ranks of the poor.

"The habit of thrift constitutes one of the greatest differences between the savage and the civilized man.

"From capital comes the first breath of life into matter previously inert.

"Capital, business ability and labor are equal members of the great triple alliance which moves the industrial world.

"Capital, business ability and labor must be united. He is an enemy to all three who seeks to sow seeds of disunion among them.

"Humanity is better than it has ever been, materially and morally. I have faith that it is destined to reach still higher and loftier planes than even the most sanguine have imagined."

Following are excerpts taken from the book:

"It is very unfortunate that the irresistible tendency of our age, which draws manufacturing into immense establishments, requiring the work of thousands of men, renders it impossible for employers who reside near to obtain that intimate acquaintance with employes which, under the old system of manufacturing in very small establishments, made the relation of master and man more pleasing to both.

"When articles were manufactured in small shops by employers who required only the assistance of a few men and apprentices, the employer had opportunities to know every one, to become well acquainted with each, and to know his merits, both as a man and as a workman; and, on the other hand, the workman, being brought into closer contact with his employer, inevitably knew more of his business, of his cares and troubles, of his efforts to succeed, and, more important than all, he came to know something of the characteristics of the man himself.

"All this is changed.

"Thus, the employes become more like human machines, as it were, to the employer, and the employer becomes almost a myth to his men. From every point of view this is a most regrettable result, yet it is one for which I see no remedy.

RESULT OF ECONOMIC LAWS.

"The free play of economic laws is forcing the manufacture of all articles of general consumption more and more into the hands of a few enormous concerns, that their cost to the consumer may be less.

"There is no longer any room for conducting the manufacture of such articles upon a small scale; expensive works and machinery costing millions are required, as the amount per ton or per yard of what we call 'fixed charges' is so great a factor in the total cost that, whether a concern can run successfully or not, in many cases, depends upon whether it divides these fixed charges—which may be said to be practically the same in a large establishment as in a smaller—by a thousand tons per day or by five hundred tons per day of product.

"Hence, the reason for the continual increase year by year in the product of your mills—not that the manufacturer wishes primarily to increase his product, but that the strain of competition forces him into extensions that he may thereby reduce more and more per ton or per yard these fixed charges, upon which the safety of his capital depends.

"It being, therefore, impossible for the employers of thousands to become acquainted with their men, if we are not to lose all feeling of mutuality between us, the employer must seek their acquaintance through other forms, to express his care for the well-being of those upon whose labor he depends for success, by devoting part of his earnings for institutions, and for the accommodation of organizations, such as co-operative stores, and I hope, in return, that the employes are to show by the use which they make of such benefactions that they, in turn, respond to this sentiment upon the part of the employers wherever it may be found.

"By such means as these we may hope to maintain to some extent the old feeling of kindliness, mutual confidence, respect and esteem which formerly distinguished the relations between the employer and his men.

"Every employer of labor is studying the young men around him, most anxious to find one of exceptional ability. Nothing in the world is so desirable for him and so profitable for him as such a man.

CAPABLE MEN IN REQUEST.

"Every manager in the works stands ready to grasp, to utilize the man that can do something that is valuable. Every foreman wants to have under him in his department able men, upon whom he can rely, and whose merits he obtains credit for, because the greatest of ability in a manager is not the man himself, but the men with whom he is able to surround himself.

"These books on the shelves will tell you the story of the rise of many men from our own ranks. It is not the educated, or so-called classically educated, man; it is not the aristocracy, it is not the monarchs, that have ruled the destinies of the world, either in camp, council, laboratory or workshop.

"The great inventions, the improvements, the discoveries in science, the great works in literature, have sprung from the ranks of the poor.

"You can scarcely name a great invention or a great discovery, you can scarcely name a great picture or a great statue, a great song or a great story, nor anything great that has not been the product of men who started, like yourselves, to earn an honest living by honest work.

"The importance of the subject is suggested by the fact that the habit of thrift constitutes one of the greatest differences between the savage and the civilized man.

"One of the fundamental differences between savage and civilized life is the absence of thrift in the one and the presence of it in the other. When millions of men each save a little of their daily earnings, these petty sums combined make an enormous amount, which is called capital, about which so much is written.

"If men consumed each day or each week all they earned, as does the savage, of course there would be no capital—that is, no savings laid up for future use.

"Now, let us see what capital does in the world. We will consider what the shipbuilders do when they have to build great ships. These enterprising companies offer to build an ocean greyhound for, let us say, £500,000, to be paid only when the ship is delivered, after satisfactory trial trips.

"Where or how do the shipbuilders get this sum of money to pay the workmen—the wood merchant, the steel manufacturer and all the people who furnish material for the building of the ship? They get it from the savings of civilized men. It is part of the money saved for investment by the millions of industrious people.

"Each man, by thrift, saves a little, puts the money in a bank, and the bank lends it to the shipbuilders, who pay interest for the use of it. It is the same with the building of a manufactory, a railroad, a canal, or anything costly. We could not have had anything more than the savage had, except for thrift.

A PARTNERSHIP OF THREE.

"The young, practical man of to-day, working at the bench or counter, to whom the fair goddess, Fortune, has not yet beckoned, may be disposed to conclude that it is impossible to start a business in this age. There is something in that.

"It is, no doubt, infinitely more difficult to start a new business of any kind to-day than it was. But it is only a difference in form, not in substance. It is infinitely easier for a young practical man of ability to obtain an interest in existing firms.

"There is partnership of three in the industrial world, when an enterprise is planned. The first of these—not in importance, but in time—is capital. Without it nothing costly can be built. From it comes the first breath of life into matter previously inert.

"The structure reared, equipped and ready to begin in any line of industrial activity, the second partner comes into operation. That is business ability. Capital has done its part.

"It has provided all the instrumentalities of production; but unless it can command the services of able men to manage the business, all that capital has done crumbles into ruin.

"Then comes the third partner, last in order of time, but not least, labor. If it fails to perform its part, nothing can be accomplished. Capital and business ability, without it brought into play, are dead. The wheels cannot revolve unless the hand of labor starts them.

"Now, volumes can be written as to which one of the three partners is first, second or third in importance, and the subject will remain just as it was before.

"Political economists, speculative philosophers and preachers have been giving their views on the subject for hundreds of years, but the answer has not yet been found, nor can it ever be, because each of the three is all-important, and every one is equally essential to the other two.

"There is no first, second or last. There is no precedence. They are equal members of the great triple alliance which moves the industrial world.

"As a matter of history, labor existed before capital or business ability, for when 'Adam digged and Eve span,' Adam had no capital, and if one may judge from the sequel neither of the two was inordinately blessed with business ability, but this was before the reign of industrialism began, and huge investments of capital were necessary.

"The three are equal partners of a grand whole. Combined they work wonders, separate, neither is of much account. Thus far, notwithstanding the differences that from time to time have unfortunately rent them apart, they have made the closing century the most beneficent of all that have preceded it.

"Humanity, the world over, is better than it has ever been, materially and morally, and I have the faith that it is destined to reach still higher and loftier planes than even the most sanguine have imagined.

"Capital, business ability and labor must be united. He is an enemy to all three who seeks to sow seeds of disunion among them."

Flannel Fools.

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Never leave off your underwear until some woman over fifty years of age tells you it is time.

"A man is known by the company he keeps."

I will add that a man is also known by the Bread he eats.

Wife, give your husband Bread made from W. Trow Co.'s Famous Flour, manufactured at Madison, Ind.; then, having good wholesome Bread to chew on, he will quit "chewing the rag."

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